North Waterford Quadrangle, Maine

Surficial geologic mapping by
Woodrow B. Thompson

Digital cartography by:
Robert A. Johnston

Robert G. Marvinney
State Geologist

Cartographic design and editing by:
Robert D. Tucker

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DEPARTMENT OF CONSERVATION MAINE

Maine Geological Survey

Address: 22 State House Station, Augusta, Maine 04333
Telephone: 207-287-2801 **E-mail:** mgs@maine.gov
Home page: http://www.maine.gov/doc/nrimc/nrimc.htm

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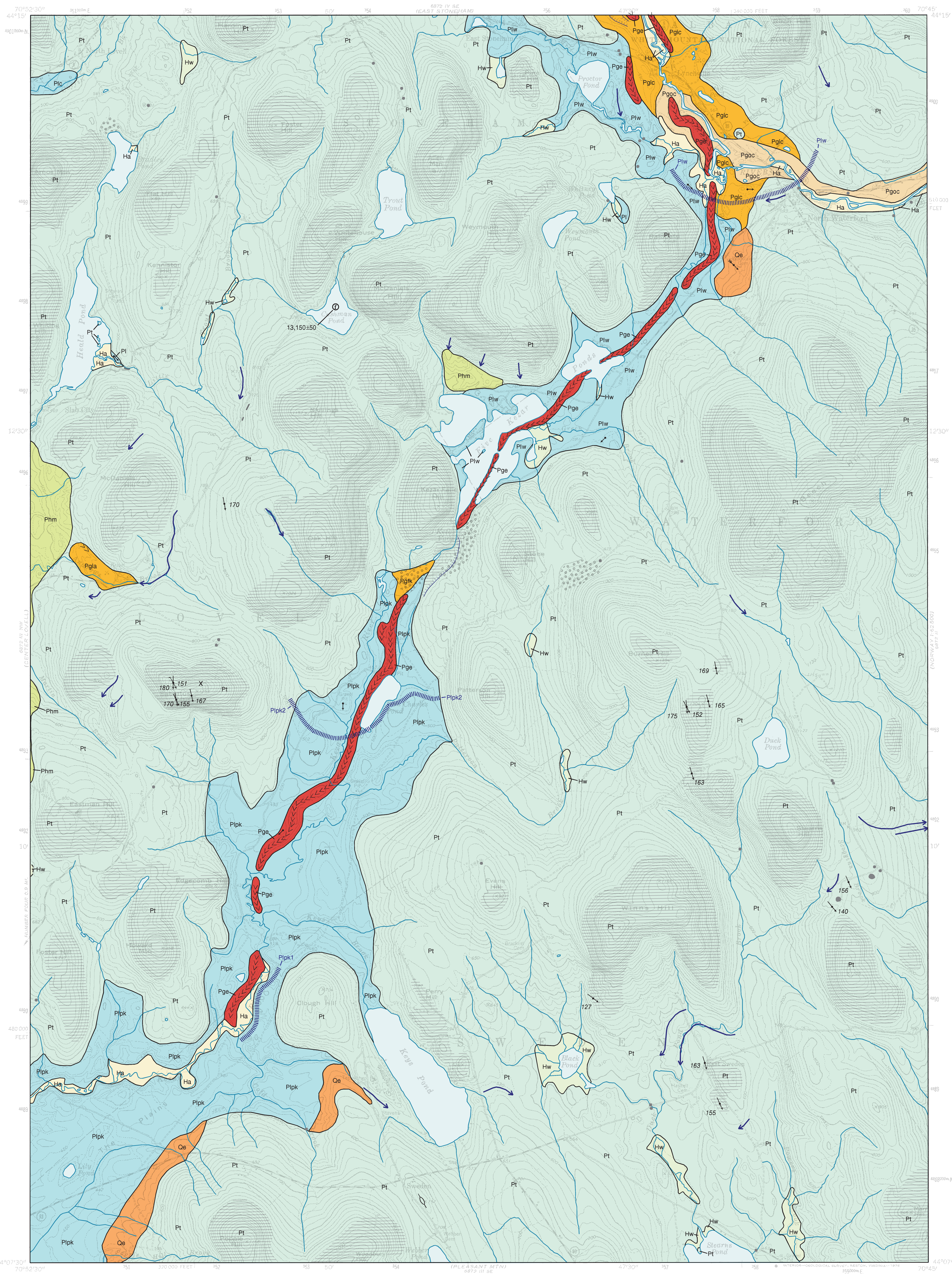
For additional information, see Open-File Report 99-4.

This map supersedes Open-File Map No. 99-3

Surficial Geology



SOURCES OF INFORMATION

Surficial geologic mapping of the North Waterford quadrangle was conducted by Woodrow B. Thompson in 1983 and 1987 for the Maine Geological Survey's sand and gravel aquifer mapping program. The author updated earlier observations in 1998-1999 to complete this map under funding from the MGS / USGS STATEMAP cooperative (award no. 98HQAG2052).

Quadrangle Location

SCALE 1 : 24,000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET

TRUE NORTH

Topographic base from U.S. Geological Survey North Waterford quadrangle, scale 1:24,000 using standard U.S. Geological Survey topographic map symbols.

The use of industry, firm, or local government names on this map is for location purposes only and does not impute responsibility for any present or potential effects on the natural resources.

Ha — **Stream Alluvium** - Sand, gravel, silt, and organic sediment. Deposited on flood plains of modern streams. Unit may include some wetland areas.

Hw — **Wetland deposits** - Peat, muck, silt, and clay. Deposited in poorly drained areas.

Qe — **Eolian deposits** - Windblown sand. Forms dunes and irregular blanket deposits on southeast side of Kezar River and Warren Brook valleys.

Pgoc — **Crooked River outwash deposits** - Sand and gravel. Outwash deposited by glacial streams in the Crooked River valley.

Pgic — **Crooked River ice-contact deposits** - Sand and gravel. Deposited when remnants of stagnant glacial ice still existed in the Crooked River valley. Locally collapsed and kettled from melting of adjacent ice.

Plc — **Coffin Brook deposits** - Sand, silt, and clay deposited in a small glacial lake impounded by remnant ice in the Kezar Lake valley (Center Lovell quadrangle).

Plw — **Glacial Lake Waterford deposits** - Sand, gravel, and silt deposited in a glacial lake controlled by spillway at Kezar Falls gorge.

Pl — **Glaciolacustrine deposits** - Small, isolated bodies of sand, silt, and gravel. Deposited in glacial lakes dammed by residual ice in the Heald Pond and Whitney Pond basins.

Pgia — **Andrews Brook deposits** - Sand, gravel, and silt. Ice-contact deposits formed by glacial meltwater streams in the Andrews Brook valley.

Pgfk — **Kezar Gorge fan** - Coarse outwash gravel, including very large boulders of local origin. Deposited by torrential flow of glacial meltwater through the Kezar Falls gorge.

Plpk — **Lake Pigwacket deposits** - Sediments deposited in glacial Lake Pigwacket. Includes delta and lake-bottom sediments.

Kezar Valley stage deposits - Sand, silt, and clay deposited in an ice-dammed stage of Lake Pigwacket that extended up the Kezar River valley.

Pge — **Esker deposits** - Sand and gravel deposited by meltwater streams in a subglacial tunnel system.

Phm — **Hummocky moraine** - Glacial till with hummocky topography. May contain lenses of sand and gravel.

Pt — **Till** - Loose to very compact, poorly sorted, massive to weakly stratified mixture of sand, silt, and gravel-size rock debris deposited by glacial ice. Locally includes lenses of water-laid sand and gravel.

Bedrock outcrops/thin-drift areas - Ruled pattern indicates areas where outcrops are common and/or surficial sediments are generally less than 10 ft thick (mapped partly from air photos). Gray areas and dots show individual outcrops.

Contact - Boundary between map units. Dashed where very approximate.

Scarp - Scarp resulting from erosion by glacial meltwater on hillside south of Kezar Falls gorge. Symbol also shows margins of large meltwater channel at north edge of quadrangle.

Ice-margin position - Line shows approximate position of the glacier margin during ice retreat, based on head of outwash for associated meltwater deposits and/or positions of meltwater channels. Numbers indicate relative ages; "1" is oldest.

Glacially streamlined hill - Symbol shows trend of long axis, which is parallel to former glacial ice-flow direction.

135 — **Glacial striation locality** - Arrow shows ice-flow direction inferred from striations on bedrock. Dot marks point of observation. Number is azimuth (in degrees) of flow direction. Where shown, flagged trend is older.

Dip of cross-bedding - Arrow shows average dip direction of cross-bedding in fluvial or deltaic deposits, which indicates direction of stream flow or delta progradation. Point of observation at dot.

Sand dune - Arrow shows trend of dune axis and indicates inferred wind direction.

Meltwater channel - Channel eroded by glacial meltwater stream. Arrow shows inferred direction of former stream flow.

<<<<< — **Crest of esker** - Shows trend of esker ridge. Chevrons point in direction of meltwater flow.

X — **Large boulder** - Site of large glacially transported erratic boulder on Sabattus Mountain.

Area of many large boulders, where observed. May be more extensive than shown.

10,150±450 (f) — **Fossil locality** - Symbol shows location where core sample was taken from sediments on floor of Cushman Pond. Organic material from the core yielded the radiocarbon age shown on the map (from Thompson and others, 1996).

USES OF SURFICIAL GEOLOGY MAPS

A surficial geology map shows all the loose materials such as till (commonly called hardpan), sand and gravel, or clay, which overlie solid ledge (bedrock). Bedrock outcrops and areas of abundant bedrock outcrops are shown on the map, but varieties of the bedrock are not distinguished (refer to bedrock geology map). Most of the surficial materials are deposits formed by glacial and deglacial processes during the last stage of continental glaciation, which began about 25,000 years ago. The remainder of the surficial deposits are the products of postglacial geologic processes, such as river floodplains, or are attributed to human activity, such as fill or other land-modifying features.

The map shows the areal distribution of the different types of glacial features, deposits, and landforms as described in the map explanation. Features such as striations and moraines can be used to reconstruct the movement and position of the glacier and its margin, especially as the ice sheet melted. Other ancient features include shorelines and deposits of glacial lakes or the glacial sea, now long gone from the state. This glacial geologic history of the quadrangle is useful to the larger understanding of past earth climate, and how our region of the world underwent recent geologically significant climatic and environmental changes. We may then be able to use this knowledge in anticipation of future similar changes for long-term planning efforts, such as coastal development or waste disposal.

Surficial geology maps are often best used in conjunction with related maps such as surficial materials maps or significant sand and gravel aquifer maps for anyone wanting to know what lies beneath the land surface. For example, these maps may aid in the search for water supplies, or economically important deposits such as sand and gravel for aggregate or clay for bricks or pottery. Environmental issues such as the location of a suitable landfill site or the possible spread of contaminants are directly related to surficial geology. Construction projects such as locating new roads, excavating foundations, or siting new homes may be better planned with a good knowledge of the surficial geology of the site. Refer to the list of related publications below.

OTHER SOURCES OF INFORMATION

1. Thompson, W. B., 1999, Surficial geology of the North Waterford 7.5-minute quadrangle, Oxford County, Maine: Maine Geological Survey, Open-File Report 99-4, 10 p.
2. Thompson, W. B., 1998, Surficial materials of the North Waterford quadrangle, Maine: Maine Geological Survey, Open-File Map 98-240.
3. Neil, C. D., 1998, Significant sand and gravel aquifers of the North Waterford quadrangle, Maine: Maine Geological Survey, Open-File Map 98-207.
4. Thompson, W. B., 1979, Surficial geology handbook for coastal Maine: Maine Geological Survey, 68 p. (out of print)
5. Thompson, W. B., and Borns, H. W., Jr., 1985, Surficial geologic map of Maine: Maine Geological Survey, scale 1:500,000.
6. Thompson, W. B., Fowler, B. K., Flanagan, S. M., and Dorion, C. C., 1996, Recession of the late Wisconsinan ice sheet from the northwestern White Mountains, New Hampshire, *in* Van Baalen, M. R. (editor), Guidebook to field trips in northern New Hampshire and adjacent regions of Maine and Vermont: New England Intercollegiate Geological Conference, 88th annual meeting, Harvard University, Cambridge, Trip B-4, p. 203-234.